

***Macroneomys* sp. (Soricidae, Mammalia) from Visogliano Shelter (Trieste, Northern Italy), a site of Middle Pleistocene man**

Flaviano FANFANI

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Abstract. In this paper the remains of *Macroneomys* (Soricidae, Mammalia) from the deposit of Visogliano Shelter (Karst of Trieste, Northern Italy), an important human occupation site of the Middle Pleistocene, are described. This genus is reported from the late Early and early Middle Pleistocene from Central Europe, from France and further for the first time from Italy. This new evidence suggests that some fossil shrews, previously attributed to *Nesiotites*, from Northern Italian localities may actually have belonged to the same genus.

Key words: *Macroneomys*, Visogliano, Italy, Middle Pleistocene.

Flaviano FANFANI, University of Florence, Earth Sciences Department and Geology and Palaeontology Museum, via G. La Pira, 4, 50121 Florence
e-mail: fanfani@geo.unifi.it.

I. INTRODUCTION

In the last twenty-two years, the archeological group of the University of Pisa, directed by Prof. Carlo Tozzi, made some excavations in the Visogliano locality (Karst of Trieste, Northern Italy). An abundant Clactonian lithic industry (group Charentian, TOZZI 1995), remains of *Homo erectus* and a rich vertebrate fauna have been reported from this early Palaeolithic site. Some studies on the mammals of this site have been performed in the last years (BAROLOMEI et al., 1976; BAROLOMEI & TOZZI 1977, 1978; BAROLOMEI 1980, 1982; MASINI 1991) and other studies are in progress.

In this locality two different kinds of deposits outcrop on the sides of a small sink hole, which is the residual of a more ancient karst system (CATTANI et al. 1991). The first layer of deposit, called "Shelter A", consists of 8 m of clays, loess, gelification of sediments and big detached limestone blocks; the second external layer of deposit includes a breccia with big blocks in a silt-cemented matrix and it is called "external Breccia".

A rich mammals assemblage is reported from Shelter A: *Vulpes* sp., *Ursus deningeri*, *Cervus elaphus* cf. *acoronatus*, *Dama* cf. *D. clactoniana*, *Capreolus capreolus*, *Megaceroides* sp., *Bison* sp., *Ovis* cf. *ammon*, *Stephanorhinus hundsheimensis* (= *Dicerorhinus* cf. *etruscus/hemiteochus*, CATTANI et al. 1991), *Equus caballus*, *Dinaromys* cf. *D. bogdanovi*, *Microtus* (*Stenocranius*) *gre-*

galis, *Microtus* ex gr. *arvalis/agrestis*, *Microtus nivalis*, *Arvicola cantiana*, *Pliomys episcopalpis*, *Ochotona* sp., *Citellus* sp., *Allocricetus bursae*, *Cricetus cricetus*, Chiroptera, *Sorex runtonensis*, *Macroneomys* sp. (the subject of the present work), *Crociodura* sp., *Talpa* cf. *romana* and *Erinaceus* sp. (CATTANI et al. 1991, TOZZI 1995, ABBAZZI L. & MASINI F. personal communication).

The macromammal taxa reported from the Breccia are: *Martes* cf. *martes*, *Meles* sp., *Ursus* cf. *arctos*, *Canis lupus*, *Sus scrofa*, *Cervus elaphus* cf. *acoronatus*, *Dama* cf. *D. clactoniana*, *Capreolus capreolus*, *Bison* sp., *Stephanorhinus hundsheimensis* (= *Dicerorhinus* sp.; CATTANI et al. 1991) and *Homo erectus* (a fragment of mandible and an isolated P³) (CATTANI et al. 1991). The small mammals from the Breccia have been studied by Bartolomei, but no complete faunal list has been published so far. Literature reports more abundant *Crociodura* and *Arvicola* than at Shelter A as well as the presence of *Apodemus* and the absence of *Ochotona* and *Microtus gregalis* (TOZZI 1995). In both kinds of deposits there occur also remains of birds, reptiles and amphibians.

The stratigraphic position, the lithological characteristics and the mammalian and pollen assemblages indicate that the external Breccia correlates with the lower part of the Shelter succession (strata 40-46). These lower layers and the Breccia were deposited during an interglacial phase with temperate climate and with wide and sparse tree cover. The upper layers of the Shelter document two stadial oscillations; both characterised by continental and dry environment. This reconstruction is based on the presence, within the mammal assemblage, of steppe-like forms such as *Ochotona* and *Microtus*. At the top of the sequence, separated by a stratigraphic gap is present the deposit with abundant *Microtus nivalis* remains; it indicates an alpine steppe-type environment.

Recurrent taxa from Galerian Italian localities are part of the Visogliano mammalian assemblage. The presence of *Ursus deningeri*, *Cervus elaphus* cf. *acoronatus*, *Dama* cf. *D. clactoniana*, a primitive species of *Arvicola* (*A. cantiana*), *Sorex runtonensis*, *Pliomys episcopalpis* and *Dinaromys* cf. *D. bogdanovi* indicate a time interval that is more ancient than late Middle Pleistocene. The occurrence of *Microtus* ex gr. *arvalis/agrestis* suggests that the early Middle Pleistocene Age should be excluded.

The interstadial phase with a temperate climate and the following colder phase, recorded in the Visogliano deposits, could be referred to the central part of the Middle Pleistocene, during a time interval approximately from 0.7 to 0.3 MA (CATTANI et al. 1991; TOZZI 1995).

The vertebrate assemblage from the lower layers of Shelter A and the small mammals from the external Breccia are being studied by researchers of the Earth Science Department, University of Florence, and the Department of Geology and Geodesy, University of Palermo. A preliminary study of the insectivore material from layers 43, 44 and 45 of Shelter A, allows the writer to report the presence of: *Erinaceus* sp., *Talpa* sp., *Crociodura* sp., and the genus *Macroneomys* sp., represented by two hemimandibles.

The present work is devoted to a study and description of the remains of *Macroneomys*. In fact, their occurrence in deposits of the Karst of Triest is an important paleobiogeographical and biocronological novelty, since hitherto this genus has been known only from the late Early and early Middle Pleistocene localities of Central - Eastern Europe and of France.

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II. SYSTEMATIC PALEONTOLOGY

Order: Insectivora

Family: Soricidae

Subfamily: Soricinae

Tribe: Neomyini MATSCHIE, 1909

Genus *Macroneomys* FEJFAR, 1966*Macroneomys* sp.

(Fig. 1, Table I)

M a t e r i a l. 1 right hemimandible with M_1 and 1 toothless left hemimandible from layer 44 of Shelter A.

D e s c r i p t i o n. Both specimens are very large in size and sturdy; the horizontal rami are very thick at the level of the third molar. The ascending ramus is low and forms a wide obtuse angle with the horizontal ramus. The posterior and anterior margins of the ascending branch are concave; the anterior margin is straight in the higher part of the vertical branch. The top of the coro-

Table I

Macroneomys sp. – Mandible – L : Length (in mm) from point P (= insertion of angular process on the lower margin of horizontal ramus) to mental foramen; H: height of ascending ramus (from point P to the top of the coronoid process); S1, S2, S3: height of the horizontal ramus in correspondence with the distal end of M_1 , M_2 and M_3 , respectively; TI : height of horizontal ramus from point P to the lower margin of the temporal fossa; AS: height from point P to condyle; SC: height of condyloid process; HC: maximum height of condyle; HCM: distance between upper and lower condylar facets on lateral side; LUF, LLF: lengths of upper and lower condyloid facets respectively. Lower dentition – M_1 : Length M_1 ; TRL1: length of the trigonid of M_1 ; TRW1: width of the trigonid of M_1 ; TAW1: width of the talonid of M_1

Parameter	Right hemimandible	Left hemimandible
L	5.48	5.22
H	5.31	5.29
S1	1.97	1.99
S2	1.71	1.77
S3	1.53	1.57
TI	2.12	1.91
AS	4.02	4.34
SC	1.67	1.76
HC	2.81	2.73
HCM	2.10	1.97
LLF	1.93	2.05
LUF	1.10	1.10
M_1	2.16	–
TRL1	1.07	–
TRW1	1.07	–
TAW1	1.23	–

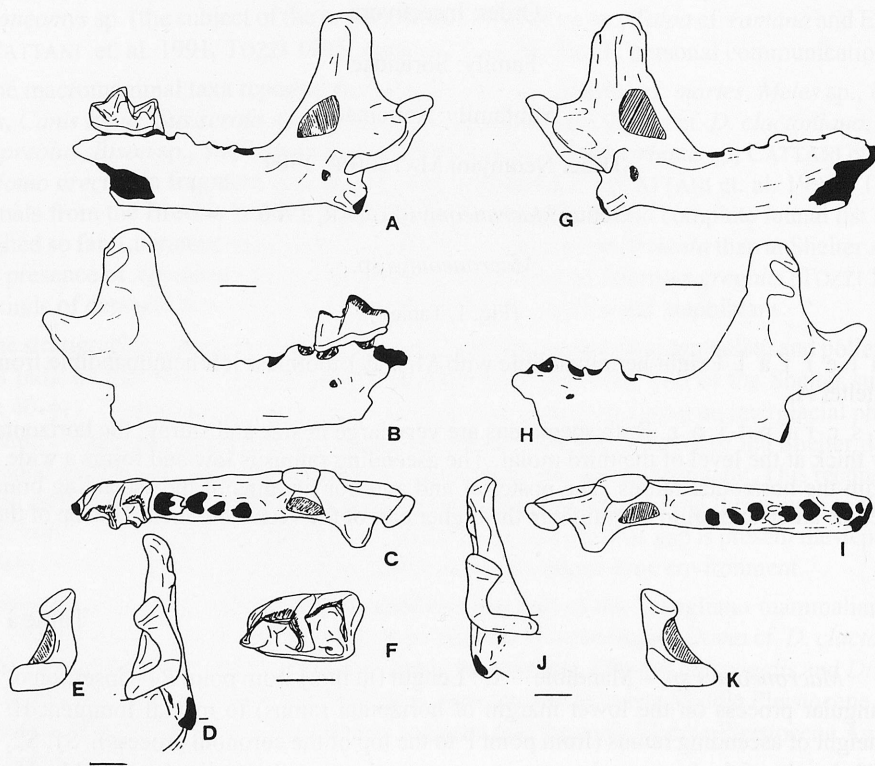


Fig. 1. *Macroneomys* sp. Right hemimandible: A – lingual side; B – labial side; C – dorsal side; D – posterior side; E – articulation surface of the condyle; F – magnification of the occlusal surface of M_1 . Left hemimandible: G – lingual side; H – labial side; I – dorsal side; J – posterior side; K – articulation surface of the condyle.

noid process is wide. The internal temporal fossa is low and deep and does not show an upward continuation. In the hemimandible with M_1 a transversal bar is present in the ascending branch, above the internal temporal fossa. On the outer side of the ascending ramus, the temporal fossa is shallow and it ends close to the level of the lower articulation facet of the condyle. At the top of the vertical branch there is a well-developed spicule, that elongates toward the upper articulation facet of the condyle. The external temporal fossa is deeper above the spicule.

The horizontal ramus of the mandible has its lower and upper margins not parallel. In fact, the lower margin is horizontal and slightly concave under M_2 , whereas the upper margin is oblique, rising anteriorly. The elliptical mandibular foramen is positioned beneath the posterior half of the internal temporal fossa. The mental foramen is underneath the hypoconid of M_1 .

The shape of the condyle allows the assignment of this material to the tribe Neomyini MATSCHIE, 1909 (= Soriculini, sensu REUMER, 1984). The condyle is robust and supported by a very strong condyloid process. On the posterior side, the condyle has a narrow interarticular area; the upper articulation facet is short and cylindrical; the lower articulation facet is elliptic and elongated. The pterygoid spicule is well formed and edges the upper side of the shallow pterygoid fossa.

The first lower molar has a thick and straight lingual cingulum; the labial cingulum is strong and wavy. The molar cuspids have dark orange pigmentation. The talonid is wider and shorter than the

trigonid. The paraconid is located in the mesial line; this gives the lingual wall of the molar a convex aspect. The entostylid is present and forms a small cuspid separated by a narrow valley from the entoconid. This last cuspid is sturdy and has a low entoconid crest. The labial valley between the hypoconid and the protoconid and the lingual valley of the trigonid do not reach their respective cingula.

III. COMPARISONS AND DISCUSSION

The tribe Neomyini has been widespread in Eurasia since late Miocene. In Europe it is represented by the following fossil and living genera: *Asoriculus*, *Nesiotites*, *Macroneomys*, *Neomysorex* and *Neomys*.

The most ancient genus is *Asoriculus* (REUMER 1984; RZEBIK-KOWALSKA 1994a-b, 1995), reported for the first time from the late Miocene localities of Brisighella (Faenza, upper Messinian, DE GIULI 1989) and Salobreña (Spain, Messinian, pre-evaporitic phase, CROCHET 1975). This genus includes various species: *Asoriculus gibberodon* PETÉNYI, 1864, the more common species, *Asoriculus thenii* MALEZ et RABEDER, 1984, reported from the Early Pleistocene of Croatia (MALEZ & RABEDER 1984) and *Asoriculus maghrebiensis* RZEBIK-KOWALSKA, 1988, from the Plio-Pleistocene of North Africa (Irhoud Ocre, RZEBIK-KOWALSKA 1988, Ahl Al Oughlam, GERAADS 1995). The first Italian occurrence of this genus is that *Asoriculus* cf. *gibberodon* from the late Miocene of Brisighella (DE GIULI 1989). In the Pliocene *Asoriculus gibberodon* has been recorded from Cascina Arondelli (BERZI et al. 1970) and Rivoli Veronese (FANFANI & MASINI in press). As for the Quaternary some specimens are known from the late Early Pleistocene of Pirro Nord and Cava Dell'Erba (*Asoriculus* cf. *gibberodon*, Gargano, DE GIULI et al. 1987; FANFANI 1995) and the smaller *Asoriculus castellarini* PASA 1947 from the Middle Pleistocene of Soave (PASA, 1947) and Monte Peglia (VAN DER MEULEN 1973).

A large and endemic species, *Asoriculus burgioi* MASINI et SARÀ 1998, has been reported from the lower Pleistocene of Monte Pellegrino (Sicily, MASINI & SARÀ 1998).

The other endemic insular genus is *Nesiotites*, with the species *Nesiotites simili* HENSEL, 1855 from Sardinia and *Nesiotites corsicanus* BATE, 1944 from Corsica. Some species, that were widespread in the Balearic Islands during the Plio-Pleistocene (REUMER 1984) and the Holocene, have been attributed to this genus: *Nesiotites ponsi* REUMER, 1979, *Nesiotites* ex. interc. *ponsi/hidalgo* REUMER, 1979 and *Nesiotites hidalgo* BATE, 1944 (REUMER 1979, 1980a, 1980b, 1981, 1982).

At present the genus *Neomys* is spread in Italy, with the species *Neomys fodiens* PENNANT, 1771 and *Neomys anomalus* CABRERA, 1907, which are common also in other European regions. The first European record of *Neomys* is from the Early Pleistocene, but this shrew became common in the Middle Pleistocene (REPENNING 1967; GEORGE 1986; RZEBIK-KOWALSKA 1994a,b).

The presence of the genera *Macroneomys* and *Neomysorex* RZEBIK-KOWALSKA, 1981 has never been reported from the Italian peninsula. They have a very restricted geographic distribution. *Neomysorex* is reported from the Early Ruscinian of Poland (RZEBIK-KOWALSKA 1981). *Macroneomys* was first described from the late Biharian of Zlaty Kun, Czech Republic (FEJFAR 1966), but some finds from Kovesvarad (Hungary, JÁNOSSY 1963; RZEBIK-KOWALSKA 1991) may date back to late Early Biharian. The presence of this shrew in the Middle Pleistocene is documented for a certainly and upper from La Fage (*M.* cf. *brachygnathus*, in JAMMOT 1973, 1975) and from Mountoussé 3 (*Soriculus brachygnathus*, in CLOT et al. 1976) in France, at Kozi Grzbiet in Poland (RZEBIK-KOWALSKA 1991) and at Voigtstedt in Germany (MAUL 1990) the species being *Macroneomys brachygnathus*.

Macroneomys must have occupied an ecological niche similar to that of other insectivores with common and convergent evolutionary trend found e.g. in *Amblyoptus*, *Anourosorex*, *Paranousorex*, *Drepanosorex*, *Dimylosorex* and *Deinsdorfia* (RZEBIK-KOWALSKA 1994b). Its good example

is the subgenus *Drepanosorex* KRETZOI, 1941; it is reported also from Italy (Rivoli Veronese, Upper Pliocene, FANFANI & MASINI 1998). This subgenus, like *Macroneomys*, is characterised by a very sturdy mandible, a hypertrophy of the coronoid process and bulbous teeth. Some authors regard these characters as adaptations to prevalent malacophagy and to a semiaquatic habitat (REUMER 1984).

The specimens from Visogliano can be attributed to this genus because of their size, sturdiness and thickness of the horizontal ramus in proximity to M_3 , the position and the shape of the ascending branch and condyle.

In Northern Italy, the presence of "*Nesiotites* sp.?" was reported from San Vito of Leguzzano (BARTOLOMEI 1966), Boscohiesanuova (BARTOLOMEI 1969) and from San Giovanni di Duino (BARTOLOMEI 1976). These occurrences in some Middle Pleistocene Italian localities leave the important question about the possibility of migration of these species into the continent open; in fact, it seems very unlikely that the insular species can disperse successfully in continental areas.

The drawings and measurements presented by BARTOLOMEI (1966) allow us to note resemblance between these remains and the specimens from Visogliano, suggesting the possibility that the remains from northern Italy referred to "*Nesiotites* sp.?" could actually represent *Macroneomys* sp.

A direct comparison between the Visogliano hemimandibles and hemimandibles of *Nesiotites simili*, *Nesiotites corsicanus* and *Nesiotites hidalgo* (collection of the Department of Earth Science in Florence) shows that many characters differ Visogliano *Macroneomys* from *Nesiotites*, even if these genera share some characters that indicate a possible close phylogenetic relationship.

Nesiotites is generally slenderer than *Macroneomys* and the former genus lacks the thickening around M_3 , that occurs in *Macroneomys*. Many other characters distinguish *Nesiotites* from *Macroneomys*, namely the sharper top of the coronoid process, the higher internal temporal fossa with upwardly elongated, the deeper and more evident external temporal fossa, the more pronounced concavity of the lower mandibular margin under M_2 , the presence of parallel mandibular margins, the further to the front positioned mandibular foramen (in this case, it is situated under the posterior half of the internal temporal fossa), the mental foramen beneath the middle of M_1 and the deep external pterygoid fossa, but with the not always evident spicule.

Big differences are also observed in the *Nesiotites* condyle, whose lower articular facet, is rectangular as in *Asoriculus*. In *Neomys* and in *Macroneomys* this facet is elliptical. The upper articular facet in the insular genus is oval, whereas in *Macroneomys* it is cylindrical.

The Visogliano molar is shorter than those of *Nesiotites* and *Neomys* and its morphology is similar to the morphology of that of *Asoriculus*. The presence of a talonid shorter and wider than the trigonid causes that the molar is smaller. M_1 of *Nesiotites*, like M_1 in *Neomys*, has a longer talonid than that in *Macroneomys* and its lingual and labial cingula are less evident and more straight. Moreover, in *Nesiotites*, the hypoconid-metaconid valley and the lingual trigonid valley reach the cingulum. In *Nesiotites* the entostylid is less evident and closer to the entoconid than in *Macroneomys*. In the insular genus the entoconid crest is also lower than in *Macroneomys*. These characters as a whole show that the specimens from Visogliano are different from *Nesiotites*, and that the remains may be attributed to *Macroneomys*.

The genus includes two forms: *Macroneomys brachygnathus* and *M. cf. brachygnathus*, the former distinguished the major inclination of the condyle and by a more anteriorly inclined ascending branch. The specimens from Visogliano show the most typical and diagnostic characters of the genus, such as the hypertrophy of the coronoid process, a marked thickness of the horizontal ramus near M_3 , the mental foramen under the hypoconid of M_1 and the short and bulbous molar. However, the specimens show some differences from the type species, such as a smaller size, a lower ascending branch, forming a wider angle with the horizontal ramus, different position of coronoid specule, a more robust and more separated condyloid process to the mandibular ramus, a wider upper sigmoid notch and a less distinct external temporal fossa.

IV. CONCLUSIONS

The Visogliano samples and probably the specimens attributed to *Nesiotites* sp.? by BARTOLOMEI (1966, 1969, 1976) document the occurrence of *Macroneomys* in Italy in the Middle Pleistocene. The Italian *Macroneomys* is different from the specimens from Central-Eastern Europe and from the French *Macroneomys* reported by JAMMOT, (1973, 1975) and by CLOT et al. (1976). The scanty remains from Visogliano do not authorise the author formally to erect a new species now, and for this reason he thinks it is an opportune moment to study the remains of *Nesiotites* sp.? described by BARTOLOMEI.

The genus *Nesiotites* can be considered to be widespread only in the Western Mediterranean Islands, whereas *Macroneomys* has a wider geographic distribution. This genus could not be too commonly widespread in the Pleistocene assemblages, which is shown by the scanty remains reported.

It is difficult to make a contribution to the phylogenetic knowledge of the European Neomyini, mainly because of the mosaic distribution of some characters between the genera of this tribe. In particular, *Macroneomys* displays some characters in common with the more ancient *Asoriculus*, i.e. short molars with large talonids, and a squat mandible, and others, such as the elliptical lower articulation facet and the more narrow interarticular area which it shares with *Neomys*.

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